

DOCKET NO. 108430.035A
Serial No. 10/699,042
Response to Office Action dated Sept. 27, 2004

Remarks

Claims 1, 3, 6-13, 15, and 18-33 are in the case. Claims 2, 4-5, 14, and 16-17 are cancelled. Claims 27-33 are new claims.

The courtesies extended by Examiner Alexander Markoff in granting a telephone interview with Brian L. Belles, attorney for applicant, on October 6, 2004 are noted with appreciation. During the interview, the differences between the invention and the teachings of U.S. Patents 6,189,552 ("Oshinowo") and 6,222,305 ("Beck et al.") were generally discussed. More specifically, Mr. Belles explained the nature of the invention and suggested a variety of ways in which the claims could be amended to differentiate Oshinowo and Beck et al. Examiner Markoff stated that he would not entertain multiple independent claim sets of varying scope in this application and that a restriction requirement would issue if such claim sets were presented.

However, Examiner Markoff and Mr. Belles agreed that neither the Oshinowo nor Beck et al. references taught or suggested a process chamber having an acoustical stack of three or more consecutive transmission layers wherein the acoustical impedance of each transmission layer in the acoustic stack consecutively decreased from layer to layer starting from the layer in contact with the acoustical energy source to the layer in contact with the process fluid. Examiner Markoff noted that the claims, as rejected, did not contain such a limitation. While exact language that would clarify this distinction was not agreed upon, Examiner Markoff suggested that Mr. Belles draft claim language that would properly reflect this aspect of the invention and submit a formal amendment for his review.

Accordingly, independent claims 1 and 13 are amended to recite that the "the acoustical stack comprising three or more consecutive transmission layers including a first transmission layer in contact with the acoustical energy source and a last transmission layer in contact with the process fluid in the process chamber" and that "from the first transmission layer to the last transmission layer, each transmission layer in the acoustical stack has an acoustical impedance value that is less than the acoustical impedance value of a consecutively preceding transmission

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layer." As discussed during the interview, neither Oshinowo nor Beck et al. tech or suggest such a system or method.

Turning first to the Oshinowo reference, Oshinowo teaches a substrate process tank having an ultrasonic transducer 22 coupled to the outside of a process tank wall 2,3 having a protective layer 24 coating the inside of the wall 2,3. See Oshinowo, Figures 1-2 and Col. 4, Lines 33-56. Oshinowo teaches that the wall 2,3 can be made of stainless steel or aluminum and the protective layer 24 is made of PFA. See Oshinowo, Col 4, Lines 42-56. While the wall 2,3 and protective layer 24 can be interpreted to be an acoustical stack of two transmission layers having "stepped down" acoustical impedance values, Oshinowo does not teach an acoustical stack of three or more layers wherein the acoustical impedance value of each transmission layer in the stack is less than the acoustical impedance value of a consecutively preceding transmission layer, as is required by claims 1 and 13.

Moreover, Oshinowo does not suggest modifying the disclosed system to meet these limitations of claims 1 and 13. The fact that Oshinowo discloses an acoustic stack having two layers of decreasing acoustic impedance values is a mere coincidence in the choice of materials. The system of Oshinowo is directed to increasing the lifetime of a process tank by coating the inside surfaces of the process tank with a layer of PFA to protect the tank from the deteriorating effects of the process chemicals used therein. See Oshinowo, Col. 2, Lines 35-45. There is absolutely no mention that acoustical impedance values played any role in designing the Oshinowo system. Thus, one skilled in the art would not be motivated to modify the system of Oshinowo for this purpose. To claim otherwise is to use impermissible hindsight to construct the claimed invention of claims 1 and 13. Such practice is improper.

Turning now to the Beck et al. reference, Beck teaches a system having an acoustic stack having six or seven transmission layers between the acoustic energy source and the process fluid. See Beck et al., Figures 2 and 5. However, a review of the noted materials of which these layers can be constructed reveals that the acoustic impedance values of the layers experience both increases and decreases in going from the piezoelectric crystals to the process fluid. See e.g., Beck et al., Col. 3, Line 3 to Col. 4, Line 23. For example, the acoustic impedance value of the

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silver and/or chrome/nickel/copper alloy layers is greater than that of the indium layer. Thus, Beck et al. did not realize the importance of a graduated step-down of the acoustic impedance values of the transmission layers in the stack, as does the present invention. Thus, Beck et al. does not teach or suggest a system having an acoustic stack of three or more layers wherein the **acoustical impedance value of each transmission layer in the stack is less than the acoustical impedance value of a consecutively preceding transmission layer**, as is required by claims 1 and 13.

Additionally, none of the other cited references, either alone or in permissible combination teach or suggest the invention as claimed in claims 1 and 13. Therefore, the rejections of claims 1 and 13 in the Office Action should be withdrawn and all the claims in the case should be found to be allowable.

Rejections Under 35 U.S.C. § 112

In paragraph 2 of the Office Action, claim 9 was rejected under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter because the term "the third acoustical impedance value" lacked proper antecedent basis. Claim 9 is amended to remove reference to the "third acoustical impedance value." All of the language in claim 9 now has proper antecedent basis. Thus, the rejection of claim 9 under 35 U.S.C. § 112, second paragraph is overcome and should be withdrawn.

Rejections Under 35 U.S.C. §§ 102 and 103

In paragraph 4 of the Office Action, claims 1, 4, 5, 9, 13, 16 and 17 were rejected under 35 U.S.C. § 102(b) as being anticipated by Oshinowo.

In paragraph 5 of the Office Action, claims 1, 2, 4, 9, 10, 11, 12-14, 16, and 25 were rejected under 35 U.S.C. § 102(b) as being anticipated by Beck et al.

In paragraph 9 of the Office Action, claims 2, 6-8, 14, and 18-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Oshinowo in view of Roberson, Jr. et al (U.S. Patent 4,977,688)

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As discussed above, claims 1 and 13 are amended to require an acoustical stack of **three or more transmission layers** and wherein the **acoustical impedance value of each transmission layer in the acoustic stack is less than the acoustical impedance value of a consecutively preceding transmission layer**. For the reasons set forth above, all rejections of the claims in the Office Action are overcome and/or obviated. It is requested that these rejections be withdrawn and the all claims found allowable.

Support for Amendments

Claims 1 and 13 are amended to specify that the acoustical stack comprises "three or more consecutive transmission layers including a first transmission layer in contact with the acoustical energy source and a last transmission layer in contact with process fluid in the process chamber" and "wherein from the first transmission layer to the last transmission layer, each transmission layer in the acoustical stack has an acoustical impedance value that is less than the acoustical impedance value of a consecutively preceding transmission layer." *No new matter is added. Support for the amendment can be found in original Figure 4 and 3, original claim 6, paragraphs [0019] - [0020] and [0032] - [0033], and the Abstract.*

Claim 13 has also been amended to recite that the substrates are in "contact" with the process fluid rather than "submerged." Because submersion is a type of fluid contacting, support is supplied by the original submersion language. However, "contacting" encompasses broader non-immersion wafer processing techniques, such as is performed in single-substrate processing. *No new matter is added. Support can be found in the original "submerging language" of original claim 13 in conjunction with paragraph [0019] which discloses that the invention is applicable to single substrate processing. Moreover, original Figure 3 shows a substrate in contact with process fluid.*

Claims 3 and 15 are amended to correct their dependency and to remove the recitation of the second transmission layer's material of construction. *No new matter is added. Support can be found in original claim 8.*

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Claims 6 and 18 are amended to specify that the number of transmission layers is three. *No new matter is added. Support can be found in original Figure 4 and original claims 6 and 18.*

Claims 8 and 20 are amended to correct their dependency and to correct inadequate antecedent basis. *No new matter is added.*

Claims 9 and 21 are amended to provide proper antecedent basis to newly amended claims 1 and 13. *No new matter is added.*

Claim 11 is amended to provide proper antecedent basis to newly amended claims 1 and 13. *No new matter is added.*

Claim 12 is amended to provide proper antecedent basis to newly amended claims 1 and 13. *No new matter is added.*

Claim 25 is amended to provide proper antecedent basis to newly amended claims 1 and 13. *No new matter is added.*

Claim 26 is amended to provide proper antecedent basis to newly amended claims 1 and 13 and to change "lesser" to "greater." *No new matter is added. Support can be found in original claim 12.*

Claims 27 and 30 are new and depend on claims 1 and 13 respectively. Claim 27 and 30 specify that "the first transmission layer is made of aluminum, titanium, or beryllium." *No new matter is added. Support can be found in original claims 8 and 20.*

Claims 28 and 31 are new and depend on claims 6 and 18 respectively. Claim 28 and 31 specify that "the second transmission layer is made of quartz." *No new matter is added. Support can be found in original claims 8 and 20.*

Claims 29 and 32 are new and depend on claims 1 and 13 respectively. Claim 29 and 32 specify that "the last transmission layer is made of PCTFE, ECTFE, PVDF, FEP, or PFA." *No new matter is added. Support can be found in original claims 8 and 20.*

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Claim 33 is new and depends on claim 13. Claim 33 specifies that the contacting step comprises submerging the substrate in the process fluid. *No new matter is added. Support can be found in original claim 13.*

It is believed that all claim rejections have been overcome and/or obviated and, thus, it is respectfully requested that all rejections be withdrawn and the claims found allowable over the prior art of record.

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